THE ECONOMIC IMPACT
OF
CHILDHOOD DEVELOPMENTAL LANGUAGE DISORDER

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Certificate of Authorship/Originality

I certify that this thesis has not been previously submitted for a degree, nor has it been submitted as part of requirements for a degree, except as part of the collaborative doctoral degree and/or fully acknowledged within the text.

I also certify that this thesis has been written by me. Any help I have received in my research work and the preparation of the thesis, itself, has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Ethics Approval

All studies used the Longitudinal Study of Australian Children (LSAC). This research was approved through the Centre for Health Economics Research and Evaluation's (CHERE) program ethics approval UTS HREC REF NO. 2015000135.

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List of Abbreviations

ABS	Australian Bureau of Statistics
ACARA	Australian Curriculum, Assessment and Reporting Authority
ADHD	Attention deficit hyperactivity disorder
AIC	Akaike information criterion
AIFS	Australian Institute of Family Studies
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
ASD	Autism spectrum disorder
ATC	Anatomical Therapeutic Chemical
BIC	Bayesian information criterion
B cohort	Birth cohort – Longitudinal Study of Australian Children
CDI	Communicative Development Inventory
CHERE	Centre for Health Economics Research and Evaluation
CI	Confidence interval
COI	Cost-of-illness
CSBS	Communication and Symbolic Behavior Scales
CSRI	Client Service Receipt Inventory
DLD	Developmental language disorder
Eq.	Equation
EMSN	Extended Medicare Safety Net
FE	Fixed effects
FTE	Full-time equivalent
GDP	Gross domestic product
GLM	Generalised linear model
GP	General practitioner
ICF	International Classification of Functioning, Disability and Health
ICF-CY	International Classification of Functioning, Disability and Health for Children and Youth
ICSEA	Index of Community Socio-Educational Advantage
IV	Instrumental variable

K cohort	Kindergarten cohort – Longitudinal Study of Australian Children
LFP	Labour force participation
LR	Log-likelihood ratio
LSAC	Longitudinal Study of Australian Children
MBS	Medicare Benefits Scheme
MLE	Maximum likelihood estimation
NAPLAN	National Assessment Program of Literacy and Numeracy
NB	Negative binomial
NESB	Non-English speaking background
NDIS	National Disability Insurance Scheme
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary least squares
OOP	Out-of-pocket
PBS	Pharmaceutical Benefits Scheme
PEDS	Paediatric quality of life scores
PIAC	Programme for the International Assessment of Adult Competencies
PPVT-III	Peabody Picture Vocabulary Test – Third Edition
PSDQ	Parental Strengths and Difficulties Questionnaire
RE	Random effects
REML	Restricted Maximum likelihood
SD	Standard deviation
SDQ	Strengths and Difficulties Questionnaire
SE	Standard error
SEP	Socioeconomic position
SES	Socioeconomic status
SLCN	Speech language and communication needs
UK	United Kingdom
USA	United States of America

Abstract

This thesis examines the economic impact of childhood developmental language disorder (DLD) on individuals, families and society, using a national Australian panel data set of 10,000 children—the Longitudinal Study of Australian Children (LSAC).

The thesis comprises four studies. The first study investigates healthcare consumption decisions of families with a child with DLD. This study demonstrates a consistent positive relationship between a child's language difficulties and their increased medical services utilisation and expenditure. These children seek more general practitioner services, and this is observed in conjunction with higher referral rates to paediatricians, speech pathologists and other specialists. Healthcare utilisation makes up a relatively small portion of the overall costs of language difficulties. However, language difficulties are likely to place an increasingly larger burden on the health and welfare system as these children move through school and after they leave school.

The second study examines the effects of DLD on future human capital and economic success. The results provide strong evidence of the impact of language difficulties on future earning potential, as a result of low levels of literacy and numeracy. This effect is greater than the effect socioeconomic disadvantage alone. Although many of these children are behind when they start school, there is some evidence that a school of high academic achievement mitigates the effects of this impairment on academic achievement. The results also demonstrate that early identification and intervention exerts a positive effect on cognitive and non-cognitive skills.

In the third study, the labour force decisions of families with a child with DLD are explored by measuring the indirect costs associated with reduced maternal labour force participation. This study highlights that the impact of language difficulties on labour force participation is considerable and represents the largest proportion of overall costs. The results show that carers of children with language difficulties substitute paid for unpaid work by working fewer hours. When their child's condition is severe or persistent, mothers are less likely to be employed, and when the child is older, mothers receive a wage rate premium to remain in the workforce. For these carers, the

substitution, respite and income effect are equally important.

The final study uses estimates from the three preceding studies to calculate the societal costs of DLD in Australia. The total cost to society of language difficulties is estimated to be between $1.362 billion per year and $3.308 billion per year (based on a prevalence range 7 to 17 per cent). The annual cost per child with language difficulties is estimated to be $4,353. Productivity losses account for the largest proportion of this cost, with 42% attributable to productivity losses of the child's mother, 30% attributable to productivity losses of the child and 28% attributable to costs borne by the health and welfare system.

While the individual costs associated with DLD are not as high as other childhood conditions such as autism spectrum disorder (ASD) and attention deficit hyperactivity disorder, its high prevalence and broad impact has made DLD an important public health concern. The total cost to society of language difficulties could be similar to the cost of asthma ($3.6 billion per year)[1] and ASD ($5.5 billion per year).

The costs associated with DLD have important implications for intervention of language disorders. This study provides decision makers with a picture of the global burden of DLD and more importantly, of the major cost components and the areas where cost containment policies would have the greatest impact and should therefore be prioritised. These estimates can be used to inform cost-effectiveness models of effective interventions for children with DLD.